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A conjecture made nearly 90 years ago has finally been confirmed, new data of *Tricondylomimus coomani* Chopard in China (Dictyoptera: Mantodea)

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Abstract: This article confirms for the first time the distribution record of *Tricondylomimus coomani* Chopard in China, and life images of this rare *Tricondyla* mimic mantis species are provided. Illustrations of its habitus and diagnostic characters are provided, and the distribution is discussed and mapped.

Keywords: Gonypetidae, mantids, mimicry insects, Oriental region, Yunnan

近 90 年前的推测终被证实，虎甲螳 *Tricondylomimus coomani* 在中国的新信息（网翅总目：螳螂目）

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摘要：本文首次证实了虎甲螳 *Tricondylomimus coomani* 在中国境内的分布记录，提供了这个罕见的、拟态缺翅虎甲的螳螂物种的活体图片及鉴别特征。绘制了本种已知的地理分布图。

关键词：跳螳科，螳螂，拟态昆虫，东洋区，云南

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Introduction

Tricondylomimus coomani is undoubtedly one of the most legendary species within Asian Mantodea, described by Chopard (1930) based on specimens collected by A. de Cooman from Tonkin, Lac Toh, Hoa-Binh. This species bears a striking resemblance to the arboreal beetle genus *Tricondyla* (Carabidae, Coleoptera). Both occur in the same geographical areas and habitats, occupying similar microhabitats, and are active on the trunks of tall trees. Consequently, *Tricondylomimus coomani* is considered a mimic of the genus *Tricondyla* (Fig. 1). These wingless tiger beetles lack stingers or poison, however, we observed that they emit a foul odor when captured, which may deter predators; we speculate that this mimicry may reduce the likelihood of this mantis species being preyed upon.

Given that the type locality of *Tricondylomimus coomani* is very close to the China's borders, Tinkham (1937) first included this species in his summary of Chinese mantids, even though he had not examined specimens collected in China. However, one female specimen he reviewed was collected in Chapa NW, Tongking (Sapa, Vietnam), which is only a few miles from China's border, bringing him to conclude that *T. coomani* almost certainly occurs in China (Figs 5B, 7). Since then, *Tricondylomimus coomani* has frequently been mentioned in the following studies of the Chinese mantid fauna; however, no reliable specimens collected from China have been documented.

Wang (1993) cited Tinkham's conjecture and cautiously added a question mark after the distribution locality "China". Subsequently, in Yang & Wang (1999)'s *Insect Fauna of Fujian: Order Mantodea*, the species was reported at Dazhulan, Wuyishan (Fujian) based on Wang's record; however, it is also noted that no preserved specimen exists for this record, rendering it questionable. In addition, the type locality "Lang'gai" cited in Wang (1993) is indicated to be erroneous; with the correct location should be "Hoa-Binh". Zhu *et al*. (2012) followed Tinkham's conjecture. In subsequent research, Stiewe & Shcherbakov (2017) redescribed this species, and its distribution range does not include China. Wu (2021) presented specimen photographs of this species in the book *Natural History of Mantodea*, noting that the specimen was collected from western Yunnan. This represents the first confirmed record of the species from China; however, no formal description or further information was provided.

This study provides the first specimen records of this legendary species within China and outlines key characteristics and potential variation based on three new specimens were collected from Wenshan and Yingjiang regions in Yunnan, alongside the first formal documentation of rare live photographs of this species. Stiewe & Shcherbakov (2017) provided dorsal views of the type specimens. This study supplements these with lateral views of the female allotype for comparison with the new specimens from China.

Material and methods

The classification system follows Schwarz & Roy (2019). Descriptive terminology for adult morphology follows Brannoch *et al*. (2017) and Schwarz & Roy (2019). Photographs were taken with a Nikon digital camera (Tokyo, Japan). The distribution map was produced with Relief Map, free map data available at https://maps-for-free.com/.

The specimens were deposited in the following institutions or private collections: **CJZ:** Collection of Jia-Zhi Zhang, Shanghai, China; **CWC:** Collection of Chao Wu, Beijing, China; **MNHN:** Muséum national d'Histoire naturelle, Paris, France.

Abbreviations

avfs, anteroventral femoral spines; **avts**, anteroventral tibial spines; **ce**, cercus; **ds**, discoidal spines; **ey**, compound eye; **fb**, femoral brush; **gs**, genicular spur; **jt**, juxta-ocular tubercles; **lf**, lower frons; **mz**, metazone; **oc**, ocellus; **pvfs**, posteroventral femoral spines; **pvts**, posteroventral tibial spines; **pz**, prozone; **t10**, tergite 10 (= supra-anal plate); **tbr**, field of tubercles; **ts**, tibial spur.

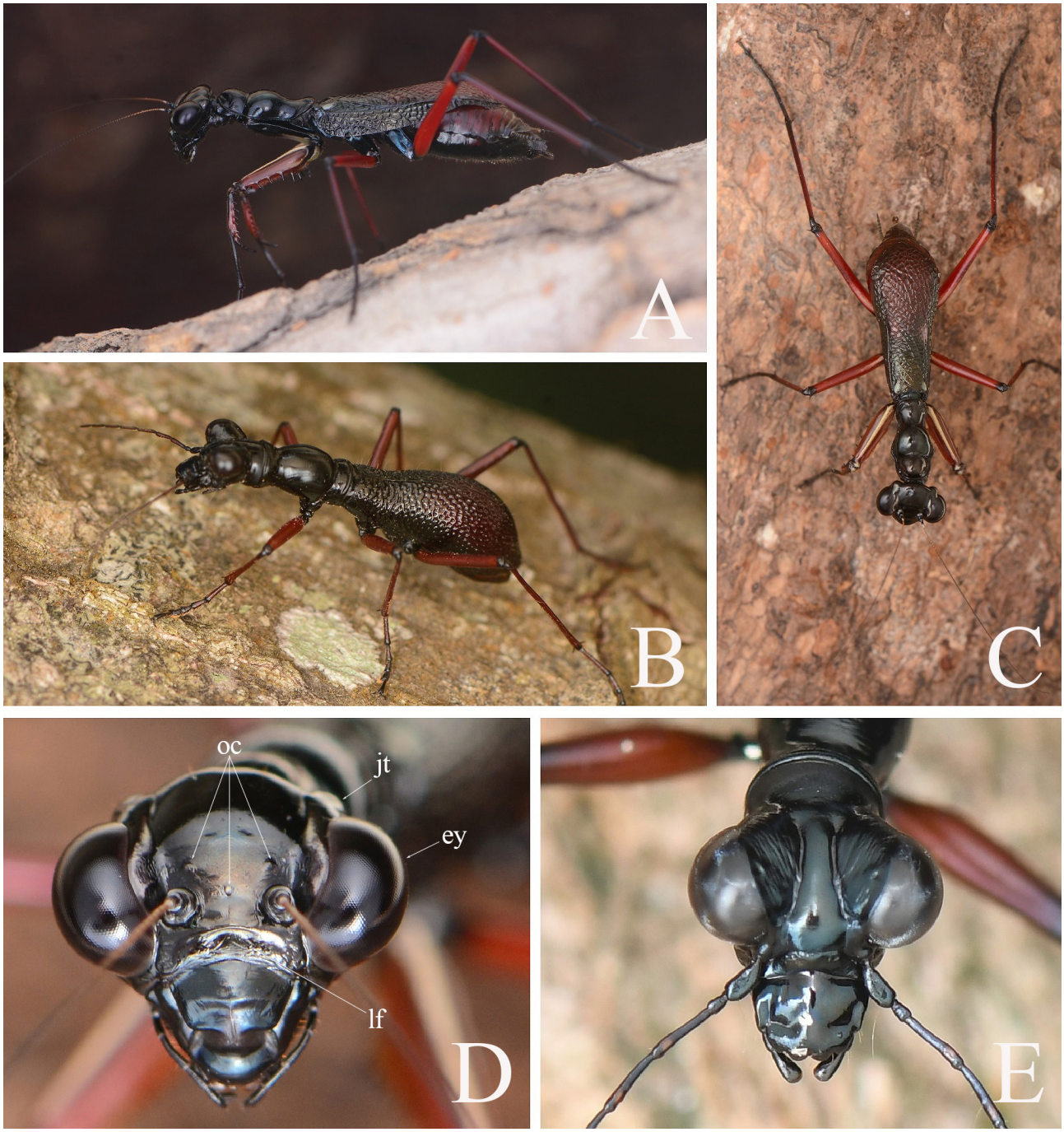

FIGURE 1. Female of *Tricondylomimus coomani* and *Tricondyla mellyi* (Coleoptera, Carabidae) in natural habitat, Yunnan, China: **A, C, D** *Tricondylomimus coomani* **B, E** *Tricondyla mellyi* **A, B** lateral view **C** dorsal view **D, E** head, anterior view.

Taxonomy

Order Mantodea Latreille, 1802 螳螂目

Family Gonypetidae Westwood, 1889 跳螳科

Subfamily Iridopteryginae Giglio-Tos, 1915

Tribe Iridopterygini Giglio-Tos, 1915

Genus *Tricondylomimus* Chopard, 1930 虎甲螳属

Type species: *Tricondylomimus coomani* Chopard, 1930.

Tricondylomimus coomani Chopard, 1930 虎甲螳

Figs 1–7

Tricondylomimus coomani Chopard, 1930: 229–232; Tinkham 1937: 489–490; Wang 1993: 93–94; Stiewe & Shcherbakov 2017: 183–188; Kamila & Sureshan 2024: 43–49.

Nemotha coomani: Beier 1935: 45; Ehrmann 2002: 239; Thinh 2010: 20; Zhu *et al*. 2012: 30.

Material examined. CHINA: 1♀ Yunnan Province, Wenshan Prefecture, Malipo County; 23.125°N, 104.709°E; 1000m; 5.VIII. 2022; leg. Wen-Xuan Bi (CWC). 1♀ Yunnan Province, Wenshan Prefecture, Luchun County, Daweishan Mt.; 22.945°N, 103.729°E; 1100m; 4. X. 2018; leg. Yi-Fan Li (CJZ). 1♀ Yunnan Province, Dehong Prefecture, Yingjiang County, Xima; 24.748°N, 97.584°E; 900m; 10. XI. 2019 (CWC). **VIETNAM:** 1 ♂ Tonkin, Lac Toh, Hoa-Binh, A de Cooman; Holotype (MNHN). 1 ♀ Tonkin, rég. de Hoa-Binh, A de Cooman 1926; Allotype (MNHN). 1♂, Tonkin, Reg de Hoa-Binh,A de Cooman 1926 (MNHN); 2 ♂, Tonkin, Rég de Hoa-Binh, De Cooman 1927 (MNHN); 1 ♀, Tonkin occ., Reg. de Hoa-Binh, 1919 (MNHN); 3 ♀, Tonkin, Rég de Hoa-Binh, A. De Cooman 1926 (MNHN).

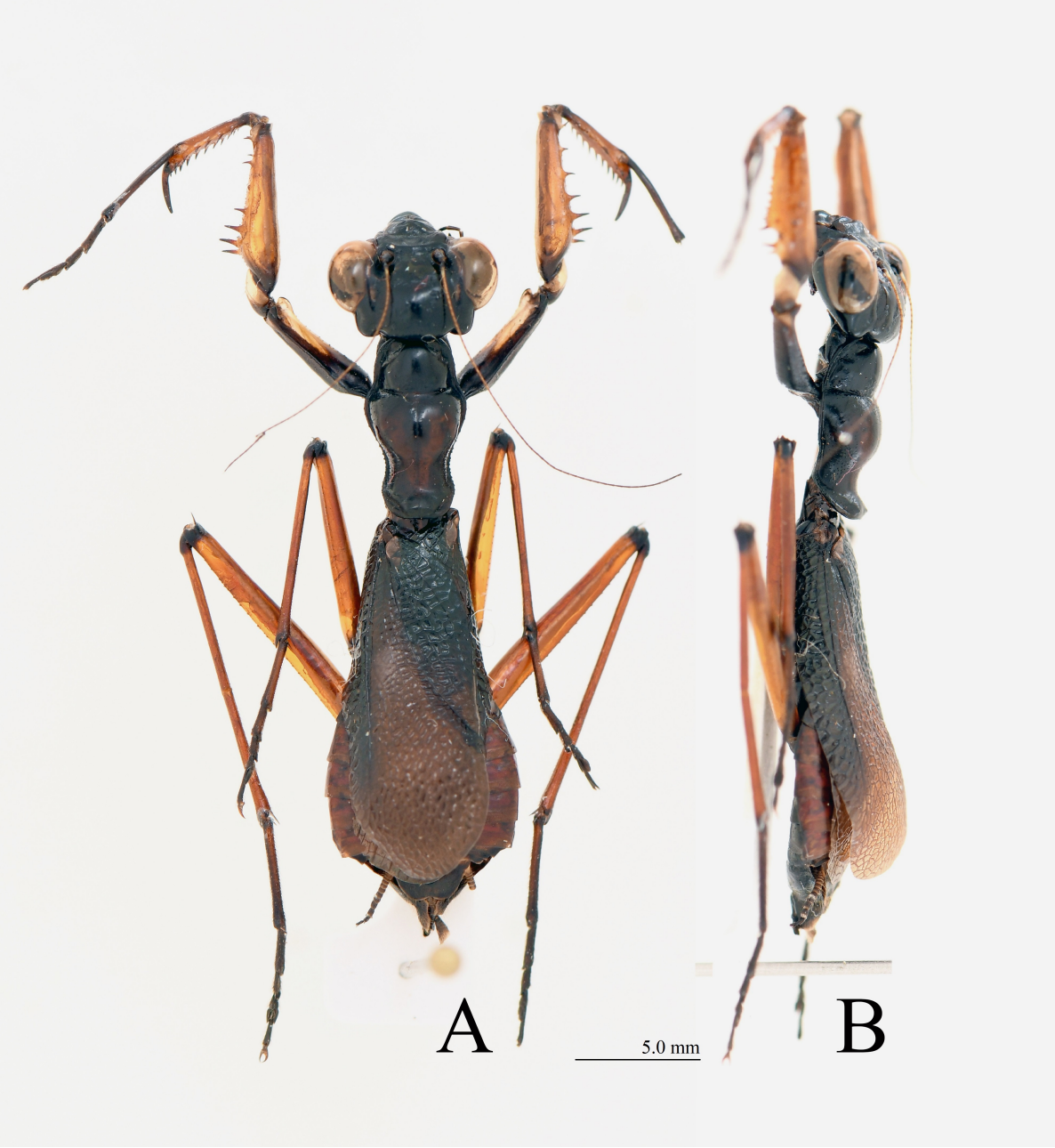

FIGURE 2. Female of *Tricondylomimus coomani* from Yunnan, China: **A** body in dorsal view **B** body in lateral view.

Diagnosis. Female from China.

Head. Large, nearly equal in width and height, significantly wider than pronotum. Eyes large, oval, bulbous. Ocelli very small, central ocellus slightly larger than lateral ocelli. Juxta-ocular tubercles protruding, rounded; vertex bulging, protruding beyond eyes. Lower frons transverse, dorsal margin and ventral margin arched, about 4 times as wide as high, with smooth surface. Clypeus wider than high, with weakly median keel. Antennae filiform; scapes inflated; flagelli slender, long, but not exceeding body length. (Fig. 1D)

Pronotum. Elongated, robust, in cross section nearly semicircular, lateral margins with very small tubercles. Prozone short, semicircular, strongly bulging dorsally; transverse groove deep. Supracoxal dilation not very distinct, rounded. Ratio of metazone length to prozone length about 2–2.3 (Fig. 2A,B). Anterior half of metazone very bulging, then strongly concave and rising again near posterior edge, the tip curves upward, ending in a tubercle. (Fig. 4A–C)

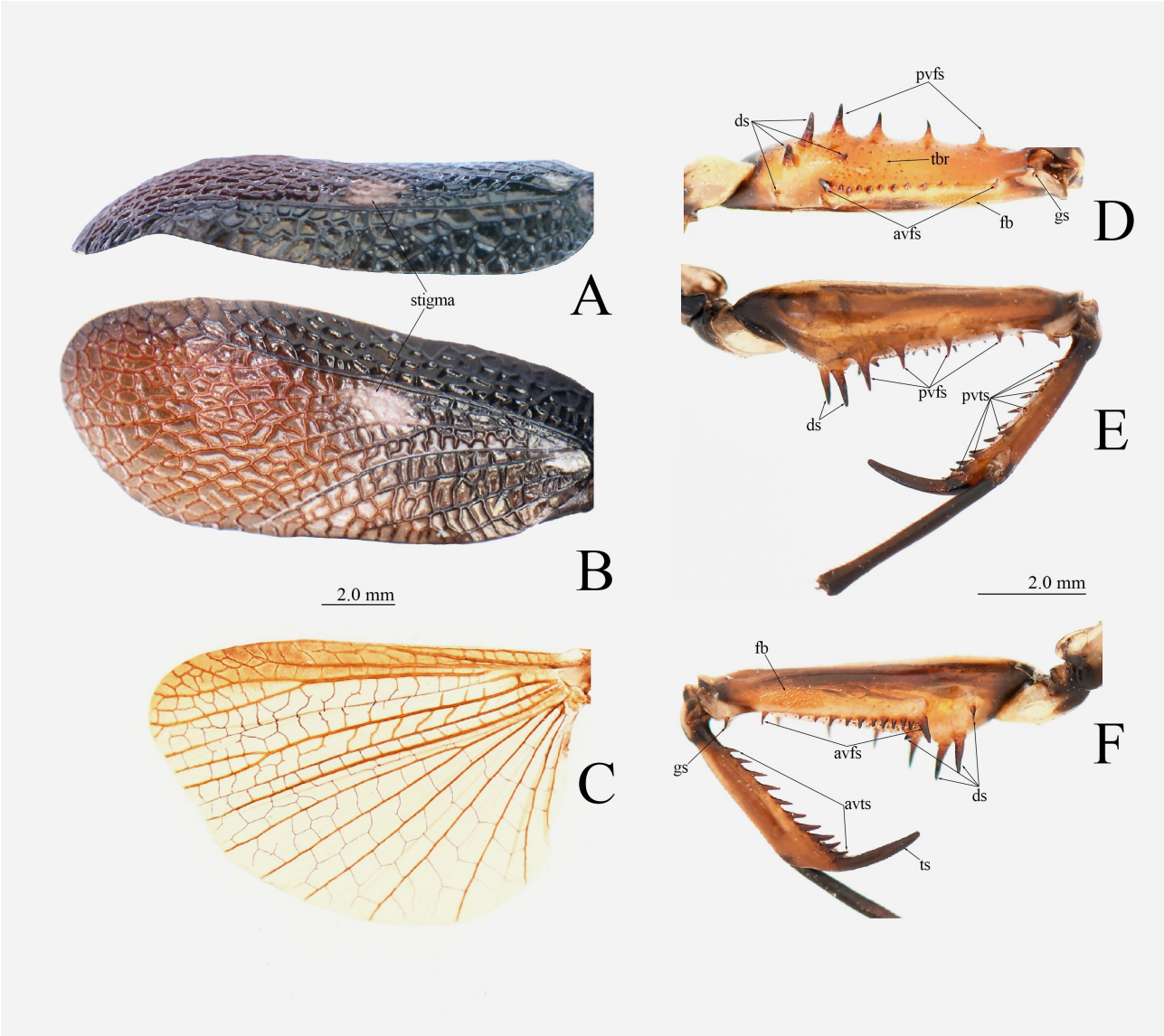

FIGURE 3. Wings and prothoracic legs of *Tricondylomimus coomani* (♀): **A, B** forewings **C** hindwing **D–F** prothoracic legs. **A** lateral view **B, C** dorsal view **D** forefemur in ventral view **E** forefemur and foretibia in posterior view **F** forefemur and foretibia in anterior view.

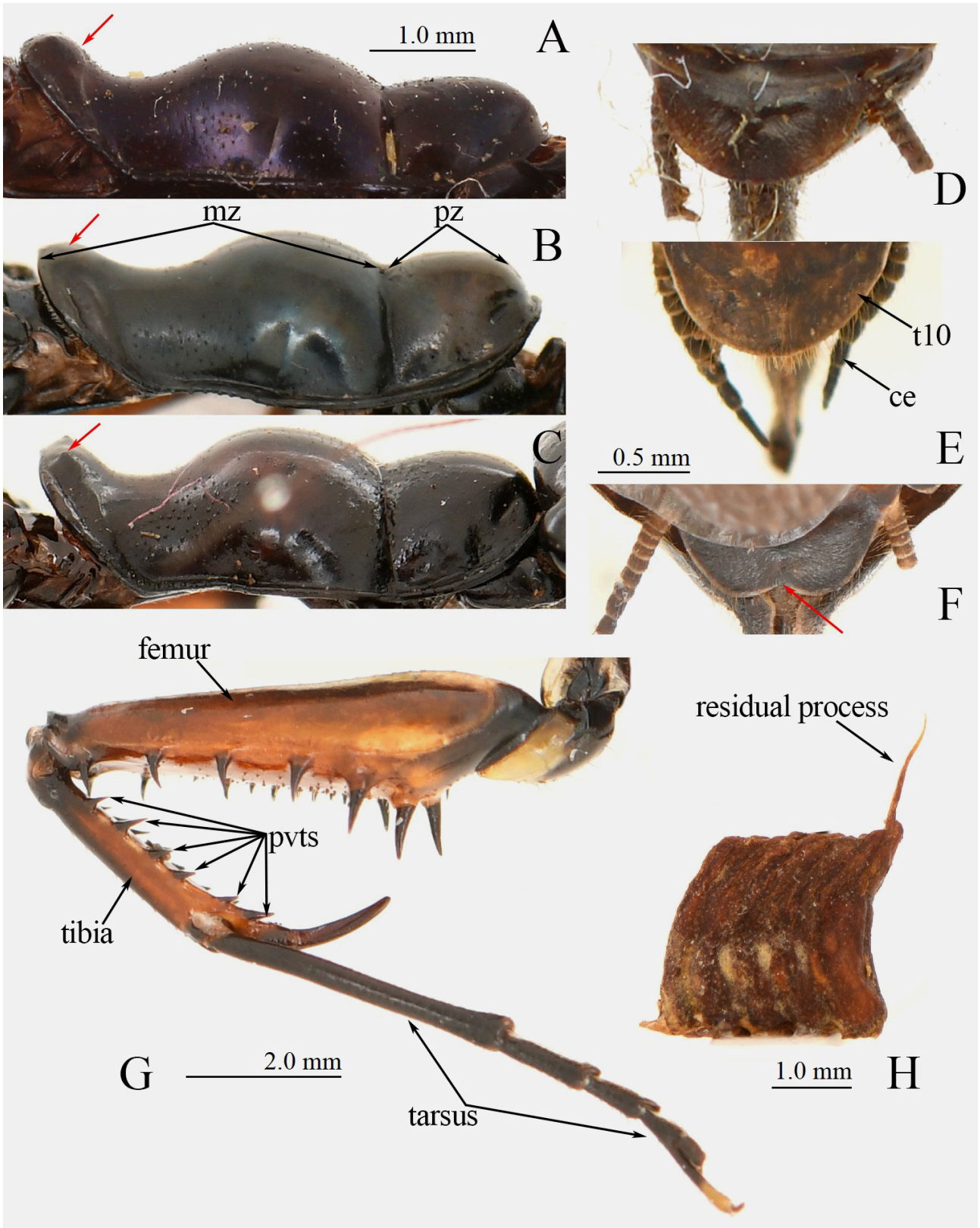

FIGURE 4. Pronotum, abdomen tip, prothoracic leg and ootheca of *Tricondylomimus coomani* (♀): **A–C** pronotum in right lateral view **D–F** abdomen tip in dorsal view **G** prothoracic leg in posterior view **H** ootheca. **A, D** allotype.

Prothoracic Legs. Elongate, robust. Coxae as long as pronotum, with a series of very small tubercles on the anterior margin, sparse. Femora robust, dorsal margin of femora straight, only basally slightly convex; femora bearing four posteroventral spines, with 4 discoidal spines, 11–12 anteroventral spines, as well as one posteroventral and one anteroventral genicular spine; claw groove lying near base; ventral surface of proximal part covered by multiple small tubercles (Fig. 3D). Tibiae straight, with 6–7 posteroventral and 10–12 anteroventral spines. Tarsus significantly longer than the tibiae, first joint of tarsi slightly longer than combined length of the remaining segments. (Figs 3D–F, 4G)

Meso- and metathoracic Legs. Long and slender, pilose. Middle legs shorter than hind legs. Femora straight, with a ventral carina, apically with one genicular spur. Tibiae as long as the femora, thin, apically with two ventral spines. Tarsus shorter than tibiae; the first joint of hind tarsi as long as combined length of the remaining segments. (Fig. 2)

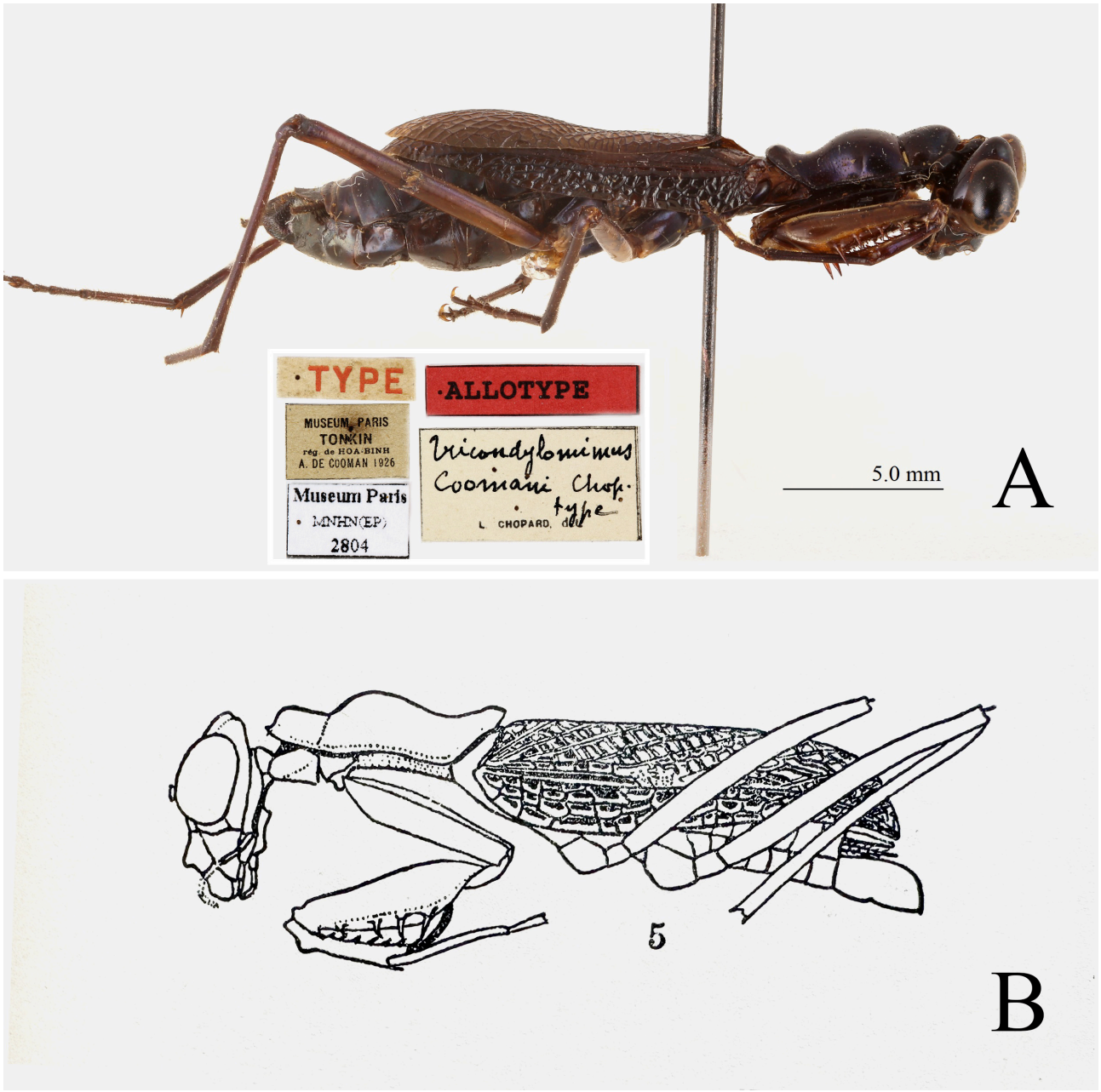

FIGURE 5. Allotype of *Tricodylomimus coomani* and illustration in Tinkham, 1937: **A** allotype and its labels (MNHN) **B** illustration in Tinkham, 1937, female from Chapa, Tongking (Sapa, Vietnam).

Wings. Wings shorter than abdomen. Forewings sclerotized, opaque, the wing veins are honeycomb-like structure and protrude, stigma indistinct; in lateral view, hind part of forewings wraps downward over the abdomen (Fig. 3A, B). Hindwings shorter than forewings, translucent, smoke-colored on leading edge, apex rounded (Fig. 3C).

Abdomen. Short, ovoid, supra-anal plate with rounded posterior edge, hairy. Cerci simple, formed by 12 cercomeres, hairy, slightly flattened, terminal joint long and conical. (Fig. 4D–F)

Ootheca. Small, nearly square in lateral view, with a straight dorsal surface, with long residual process on the distal end, residual process slender and nearly filiform; about 10 egg chambers present in the ootheca (Fig. 4H).

Colouration.

Body uniformly glossy black, gradually transitioning to a burgundy hue. Head and thorax glossy black with a metallic sheen (Fig. 1D). Antennae with basal segments glossy black; remaining segments brown, gradually darkening toward the apex. Wings glossy black at the base, gradually transitioning to a burgundy hue; stigma grey; base of preplicatum grey (Fig. 1A, C). Abdomen dorsal dark burgundy; ventral glossy black; cerci blackish brown. Forecoxae predominantly glossy black; anterior part of dorsal surface near the trochanter semi-translucent. Trochanters semi-translucent, with articulation to forecoxae black. Forefemora wine red, darker at both sides of the articulations; apices of spines darkened; dorsal surface yellowish brown. Fore tibiae wine red, darker laterally. Fore tarsi black. Meso- and metacoxae glossy black with a metallic sheen. Meso- and metafemora red, with black at articulations. Meso- and metatibiae dark red, articulations black (Fig. 1A, C). Meso- and metatarsi black.

Morphological variability.

Based on examination of the type specimens and three additional specimens from China, we found that the degree of posterior extension of the pronotum varies among individuals (Fig. 4A–C). In addition, among the two specimens from Wenshan, China, one specimen possesses seven posteroventral tibial spines (Fig. 3E) instead of six in common, and another specimen, the supra-anal plate margin is curved in the middle rather than the normally rounded apex (Fig. 4D–F).

Measurements (length in mm).

Body length (head to abdomen end): 24.80–25.36; body length (head to wings): 20.20–21.65; head width: 5.17–5.42; pronotum length: 5.76–6.50; pronotum maximum width: 2.95–3.23; forecoxae length: 4.38–5.27; forefemora length: 5.33–5.80; fore tibiae length: 4.19–4.35; fore tarsus length: 6.67–7.43; middle femora length: 6.23–7.35; middle tibiae length: 6.26–6.81; middle tarsus length: 5.29–5.64; hind femora length: 8.41–9.12; hind tibiae length: 9.03–10.16; hind tarsus length: 7.24–8.44; forewings length: 11.44–12.16; hindwings length: 9.85–10.44.

Remarks.

Kamila & Sureshan (2024) recorded the distribution of this species in Namdapha National Park, Assam Region, Northeast India, significantly expanding its known range (Fig. 7). The Yingjiang (Yunnan, China) specimen in this study bridges the distribution areas of Northeast India and the Indochinese Peninsula, suggesting that this species may have a broader distribution within the region.

Biology.

In life, the prothoracic legs of *Tricondylomimus coomani* are not folded beneath the prothorax, as in most mantids. Instead, the forelegs support the body just like the meso- and metathoracic legs: the forecoxae are held close to the body, while the forefemora and tibiae remain extended. During locomotion, this species uses all six legs to support their body. This distinctive posture may cause *T. coomani* to visually resemble flightless tiger beetle *Tricondyla* (Fig. 1). Although the hindwings are reduced in size, the species still retain some functional capacity. Observations under captive conditions indicate that when *T. coomani* jumps from one branch to another over relatively long distances, it expands its wings and beats the hindwings during the leap. This unique behaviour may serve to buffer impact or aid stability. After landing on a new branch, individuals rapidly adjust their body axis to

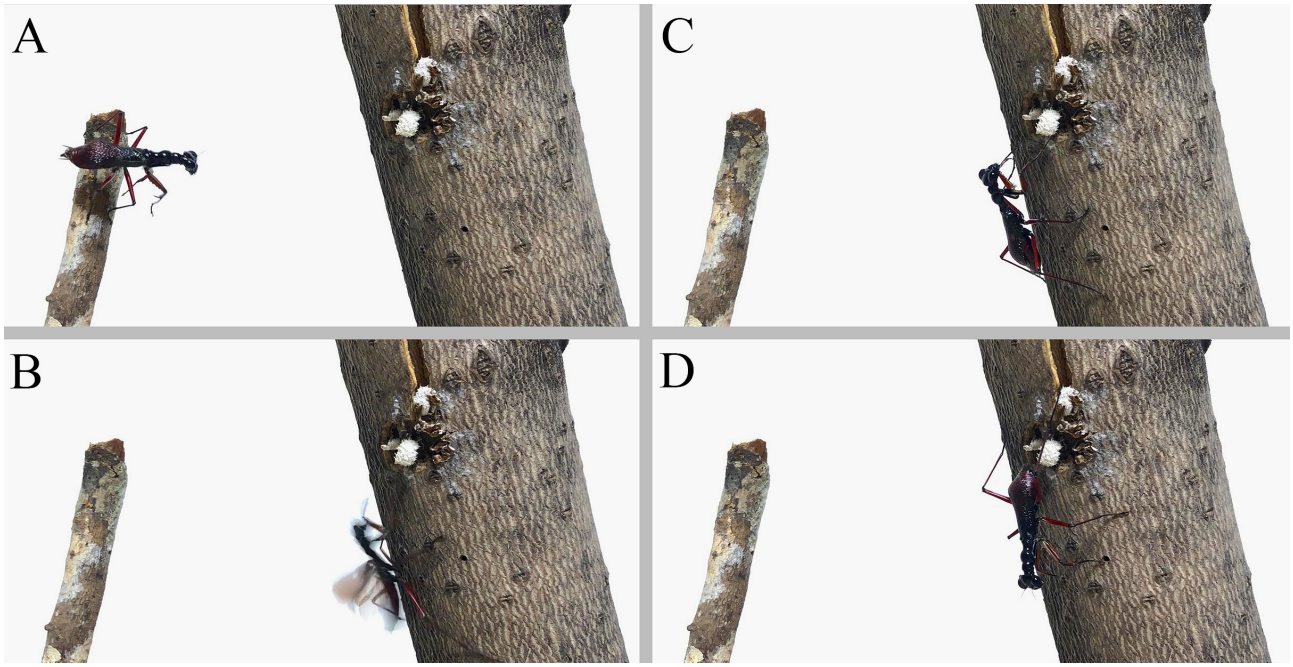

FIGURE 6. *Tricodylomimus coomani* leaps among the branches.

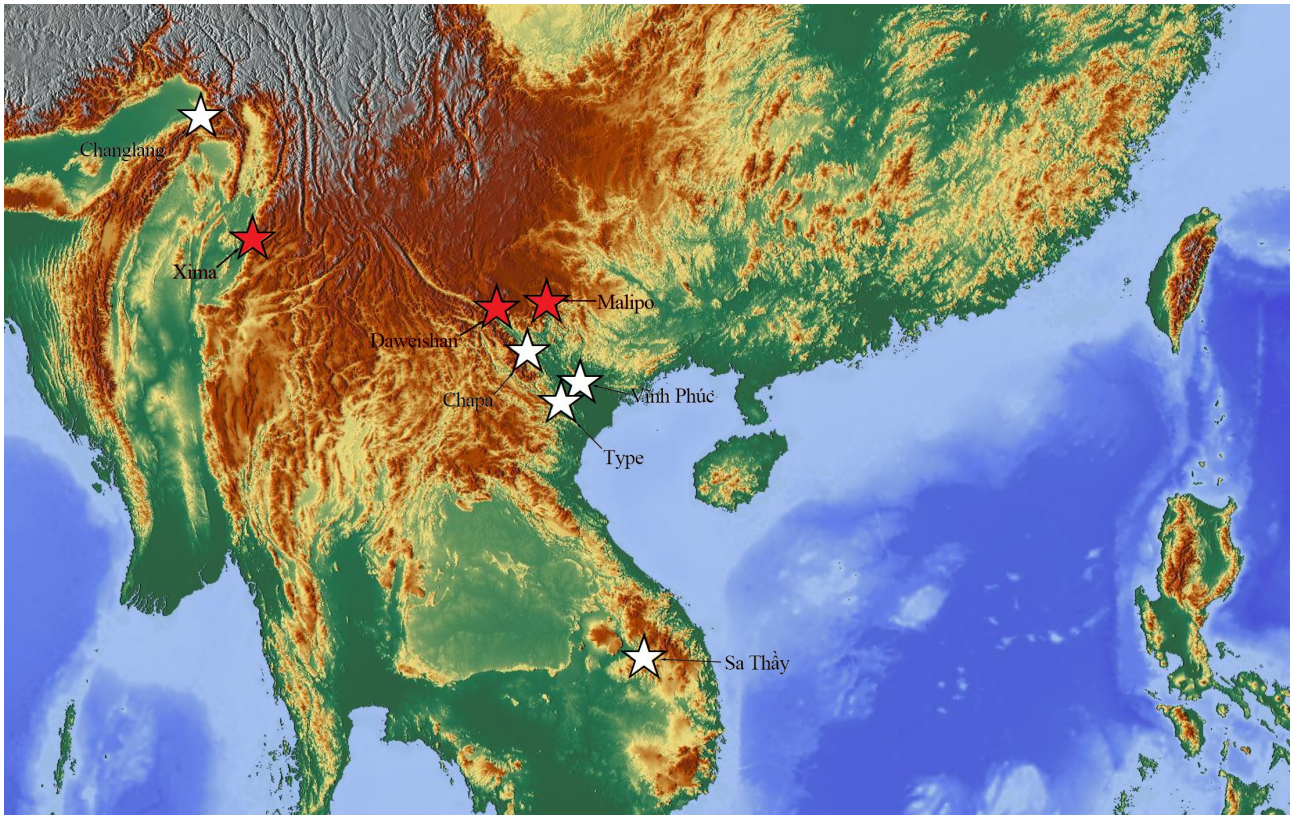

FIGURE 7. Geographical distribution of *Tricodylomimus coomani* in Asia. **Red pentagram:** new records in China **White pentagram:** previous records, by Chopard 1930 (Type Hoà Bình, Vietnam), Tinkham 1937 (Chapa=Sapa, Vietnam), Thinh 2010 (Sa Thầy, Vietnam), Stiewe & Shcherbakov 2017 (Vĩnh Phúc, Vietnam), and Kamila & Sureshan, 2024 (Changlang, India).

maintain their head oriented downward (Fig. 6A–D). When approached, *T. coomani* individuals swiftly move to the opposite side of the branch. They frequently reposition themselves to different sides of the branch or move vertically to avoid disturbance, and will generally not leap unless no alternative escape route is available. Under captive conditions, *T. coomani* shows a preference for smaller prey, including ants, small cockroach nymphs, cricket nymphs, and flies, while generally avoiding larger prey approximately half the length of its own body size. A record from Wenshan, Yunnan, shows an individual being collected at night, under a leaf on a thin branch close to the tree trunk. This suggests that the species may be actively moving on tree trunks during the daytime, while resting under the leaves at night.

Distribution.

China (Yunnan); Vietnam; India.

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Additional information

Author contributions: C Wu was responsible for literature review and manuscript writing; J-Z Zhang and C Wu were responsible for the revision and refinement of the manuscript.

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Data availability: All of the data that support the findings of this study are available in the main text.

Ethical statement: No ethical statement was reported.

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Painting Gallery

金裳凤蝶 *Troides aeacus* (Papilionidae) and 西藏关木通 *Isotrema griffithii* (Aristolochiaceae)
illustrated by Cai-Wen NIE [聂采文] (Beijing, China)